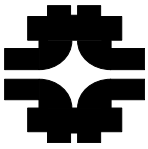

DZERO SUPERCONDUCTING SOLENOID RTD INSTRUMENTATION READINGS UPON RECIEPT AT FERMILAB

ENGINEERING NOTE
3823.111-EN-487

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I. Introduction

This engineering note documents the Dzero Superconducting Solenoid Platinum RTD, Carbon Glass RTD, and Helium level gage instrumentation values upon reciept at Fermilab. This note is concerned with the internal instrumentation, the external instrumentation can easily be repaired if any problems arise. The Solenoid was Purchased from Toshiba and shipped from the Kehin Works in Japan. The Solenoid was received at Dzero May 12, 1997.

The Solenoid was shipped in three large components. They are the Solenoid, Control Dewar, and Chimney. There are 2 main instrumentation port areas where all the internal instrumentation is available to the outside world. These 2 places are the top of the Control Dewar and the North end of the Solenoid.

These two instrumentation feedthrough area's have Cyocera hermetic feedthrough port connectors welded into place. The Cyocera connector can and does mate with the Burndy Bantom cable end connector of the same pin/socket number. Since the Hermetic feedthrough and cable connector are different manufacturers, the pin layout pattern is not the same. The Toshiba drawings show both manufacturers' pin numbers. The Dzero engineering notes show only the Burndy pin #s.

All of the instrumentation checked out fine with the exception of the following:

1. TR3278
   The TR3278 connector body had fallen off the supporting pluming during shipping. At least one of the conductors inside the tubing had broken. Toshiba has inspected this problem and promised a fix when they come to make up the Chimney field joints.
2. TP3346
   The -V is shorted to the -I of the RTD. Toshiba had found either the -V or the -I open and decided to short the -V to the -I inside the hermetic feedthrough connector on the inside of the vacuum vessel. This can be measure properly by switching the RTD channel electronics that reads TP3346 to a 3 wire input instead of a 4 wire input. This will compensate for the lead resistance on the side of the RTD that has the stimulation current being carried by the voltage lead.

Toshiba has supplied Fermilab with a complete set of as built drawings. Two of these drawings were used for the Solenoid an Control Dewar connector pin layouts. These drawings are:

1. Control Dewar	Toshiba Drawing # 1KN103395 sheet 1 of 3. Revision C.
2. Solenoid	Toshiba Drwaing # 1KN103377 sheet 1 of 3. Revision D.

Caution: These drawing revision numbers are the most recent and should be the revisions used in any reference. There are major changes between previous revisions and this revision in connector pin layout assignments.

II. Solenoid North End Feedthrough

A. Connector #1

Solenoid N. End Feedthrough Connector #1

Tag	Burndy 48 Pin	Function	Wire Type	Wire Color	Resistance ? Value	? with Cables	Toshiba 5/28/97	Toshiba DW	Status
TR3301	A to U	V+ to V-	ss to ss	Grn to wht	146.15	150	163	16.85	GOOD
	A to T	V+ to I+	ss to cu	Grn to red	72.79	76.5			
	A to S	V+ to I-	ss to cu	Grn to blk	81.45	85.5			
	U to T	V- to I+	ss to cu	Wht to red	81.53	85			
	U to S	V- to I-	ss to cu	Wht to blk	72.51	76.5			
	T to S	I+ to I-	cu to cu	Red to blk	16.85	20	29	12.15	
TR3302	R to P	V+ to V-	ss to ss	Grn to wht	175.89	179	190	14.11	GOOD
	R to N	V+ to I+	ss to cu	Grn to red	88.07	93.5			
	R to M	V+ to I-	ss to cu	Grn to blk	96.75	102			
	P to N	V- to I+	ss to cu	Wht to red	96.45	100.5			
	P to M	V- to I-	ss to cu	Wht to blk	88.4	92			
	N to M	I+ to I-	cu to cu	Red to blk	17.82	21.5	33	15.18	
TR3303	L to K	V+ to V-	ss to ss	Grn to wht	123.61	126.5	140	16.39	GOOD
	L to J	V+ to I+	ss to cu	Grn to red	60.77	64			
	L to H	V+ to I-	ss to cu	Grn to blk	69.5	73			
	K to J	V- to I+	ss to cu	Wht to red	69.80	73			
	K to H	V- to I-	ss to cu	Wht to blk	60.91	64			
	J to H	I+ to I-	cu to cu	Red to blk	15.7	18.5	28	12.3	
TR3304	G to F	V+ to V-	ss to ss	Grn to wht	69.27	76	76	6.73	GOOD
	G to E	V+ to I+	ss to cu	Grn to red	32.65	36			
	G to D	V+ to I-	ss to cu	Grn to blk	41.12	44.5			
	F to E	V- to I+	ss to cu	Wht to red	41.45	45			
	F to D	V- to I-	ss to cu	Wht to blk	32.73	36.5			
	E to D	I+ to I-	cu to cu	Red to blk	13.31	17	20	6.69	
TR3305	C to B	V+ to V-	ss to ss	Grn to wht	120.27	124.5	128	7.73	GOOD
	C to V	V+ to I+	ss to cu	Grn to red	59.1	62.5			
	C to k	V+ to I-	ss to cu	Grn to blk	68.05	71.5			
	B to V	V- to I+	ss to cu	Wht to red	67.9	71.5			
	B to k	V- to I-	ss to cu	Wht to blk	59.3	62.5			
	V to k	I+ to I-	cu to cu	Red to blk	15.69	19	30	14.31	
TR3306	j to i	V+ to V-	ss to ss	Grn to wht	70.81	74.5	84	13.19	GOOD
	j to h	V+ to I+	ss to cu	Grn to red	33.62	37.5			
	j to g	V+ to I-	ss to cu	Grn to blk	42.42	46			
	i to h	V- to I+	ss to cu	Wht to red	42.48	46			
	i to g	V- to I-	ss to cu	Wht to blk	33.86	37			
	h to g	I+ to I-	cu to cu	Red to blk	14	17	26	12	

TR3317	f to e	V+ to V-	ss to ss	Grn to wht	67.18	77	84	16.82	**GOOD**
	f to d	V+ to I+	ss to cu	Grn to red	34.42	38			
	f to c	V+ to I-	ss to cu	Grn to blk	43.46	47			
	e to d	V- to I+	ss to cu	Wht to red	43.52	47.5			
	e to c	V- to I-	ss to cu	Wht to blk	34.72	38.5			
	d to c	I+ to I-	cu to cu	Red to blk	14.05	18	21	6.95	
TR3318	b to a	V+ to V-	ss to ss	Grn to wht	105.68	109	112	6.32	**GOOD**
	b to Z	V+ to I+	ss to cu	Grn to red	51.4	55			
	b to Y	V+ to I-	ss to cu	Grn to blk	60	63			
	a to Z	V- to I+	ss to cu	Wht to red	60.03	63.5			
	a to Y	V- to I-	ss to cu	Wht to blk	51.88	55.5			
	Z to Y	I+ to I-	cu to cu	Red to blk	14.32	18	22	7.68	
TR3319	X to W	V+ to V-	ss to ss	Grn to wht	100.12	104	110	9.88	**GOOD**
	X to m	V+ to I+	ss to cu	Grn to red	48.63	53			
	X to w	V+ to I-	ss to cu	Grn to blk	57.2	61			
	W to m	V- to I+	ss to cu	Wht to red	57.22	61			
	W to w	V- to I-	ss to cu	Wht to blk	48.99	52			
	m to w	I+ to I-	cu to cu	Red to blk	14.27	18	21	6.73	
TR3320	v to u	V+ to V-	ss to ss	Grn to wht	89.25	93.5	101	11.75	**GOOD**
	v to t	V+ to I+	ss to cu	Grn to red	43.63	47.5			
	v to s	V+ to I-	ss to cu	Grn to blk	51.86	56			
	u to t	V- to I+	ss to cu	Wht to red	51.73	55.5			
	u to s	V- to I-	ss to cu	Wht to blk	43.24	47			
	t to s	I+ to I-	cu to cu	Red to blk	14.31	18	35	20.69	
TR3321	r to q	V+ to V-	ss to ss	Grn to wht	50.54	54	64	13.46	**GOOD**
	r to p	V+ to I+	ss to cu	Grn to red	23.34	26.5			
	r to n	V+ to I-	ss to cu	Grn to blk	31.36	35			
	q to p	V- to I+	ss to cu	Wht to red	31.79	35			
	q to n	V- to I-	ss to cu	Wht to blk	23.31	26.5			
	p to n	I+ to I-	cu to cu	Red to blk	12.54	15.5	26	13.46	
TR3322	x to aa	V+ to V-	ss to ss	Grn to wht	55.12	58.5	77	21.88	**GOOD**
	x to z	V+ to I+	ss to cu	Grn to red	25.85	28.5			
	x to y	V+ to I-	ss to cu	Grn to blk	33.73	37			
	aa to z	V- to I+	ss to cu	Wht to red	34.11	37.5			
	aa to y	V- to I-	ss to cu	Wht to blk	25.49	29			
	z to y	I+ to I-	cu to cu	Red to blk	12.73	16	30	17.27	

B. Connector #2

Solenoid N. End Feedthrough
Connector #2

Tag	Burndy 48 Pin	Function	Wire Type	Wire Color	Resistance ? Value	? with Cables	Toshiba 5/28/97	DW	Status
TR3330	A to U	V+ to V-	ss to ss	Grn to wht	152.51	160	161	8.49	**GOOD**
	A to T	V+ to I+	ss to cu	Grn to red	76.03	83			
	A to S	V+ to I-	ss to cu	Grn to blk	84.59	100			
	U to T	V- to I+	ss to cu	Wht to red	84.6	88			
	U to S	V- to I-	ss to cu	Wht to blk	76.02	79			
	T to S	I+ to I-	cu to cu	Red to blk	16.69	20	19	2.31	
TR3331	R to P	V+ to V-	ss to ss	Grn to wht	120.51	124	126	5.49	**GOOD**
	R to N	V+ to I+	ss to cu	Grn to red	59.3	63			
	R to M	V+ to I-	ss to cu	Grn to blk	67.89	72			
	P to N	V- to I+	ss to cu	Wht to red	67.96	73			
	P to M	V- to I-	ss to cu	Wht to blk	59.26	64			
	N to M	I+ to I-	cu to cu	Red to blk	15.33	20	29	13.67	
TR3332	L to K	V+ to V-	ss to ss	Grn to wht	93.59	98	101	7.41	**GOOD**
	L to J	V+ to I+	ss to cu	Grn to red	45.51	51			
	L to H	V+ to I-	ss to cu	Grn to blk	52.67	60			
	K to J	V- to I+	ss to cu	Wht to red	54.04	70			
	K to H	V- to I-	ss to cu	Wht to blk	45.46	60			
	J to H	I+ to I-	cu to cu	Red to blk	14.48	18	29	14.52	
TR3333	G to F	V+ to V-	ss to ss	Grn to wht	133.59	138	138	4.41	**GOOD**
	G to E	V+ to I+	ss to cu	Grn to red	67.68	72			
	G to D	V+ to I-	ss to cu	Grn to blk	74.88	80			
	F to E	V- to I+	ss to cu	Wht to red	75.21	82			
	F to D	V- to I-	ss to cu	Wht to blk	67.44	74.5			
	E to D	I+ to I-	cu to cu	Red to blk	16.49	20	26	9.51	
TR3334	C to B	V+ to V-	ss to ss	Grn to wht	100.11	104.5	113	12.89	**GOOD**
	C to V	V+ to I+	ss to cu	Grn to red	48.89	56.5			
	C to k	V+ to I-	ss to cu	Grn to blk	57.18	65			
	B to V	V- to I+	ss to cu	Wht to red	57.16	60			
	B to k	V- to I-	ss to cu	Wht to blk	48.72	52			
	V to k	I+ to I-	cu to cu	Red to blk	14.23	17.5	25	10.77	
TR3335	j to i	V+ to V-	ss to ss	Grn to wht	67.81	73	95	27.19	**GOOD**
	j to h	V+ to I+	ss to cu	Grn to red	32.18	36			
	j to g	V+ to I-	ss to cu	Grn to blk	40.37	45			
	i to h	V- to I+	ss to cu	Wht to red	40.54	45			
	i to g	V- to I-	ss to cu	Wht to blk	31.93	36			
	h to g	I+ to I-	cu to cu	Red to blk	13.51	17.5	18	4.49	

TR3343	f to e	V+ to V-	ss to ss	Grn to wht	144.75	145.5	150	5.25	**GOOD**
	f to d	V+ to I+	ss to cu	Grn to red	72.82	76			
	f to c	V+ to I-	ss to cu	Grn to blk	80.79	84			
	e to d	V- to I+	ss to cu	Wht to red	80.88	86.5			
	e to c	V- to I-	ss to cu	Wht to blk	72.62	79			
	d to c	I+ to I-	cu to cu	Red to blk	16.47	22	21	4.53	
TR3344	b to a	V+ to V-	ss to ss	Grn to wht	98.27	103	119	20.73	**GOOD**
	b to Z	V+ to I+	ss to cu	Grn to red	48.03	51.5			
	b to Y	V+ to I-	ss to cu	Grn to blk	56.99	61.5			
	a to Z	V- to I+	ss to cu	Wht to red	56.94	63.5			
	a to Y	V- to I-	ss to cu	Wht to blk	47.65	53.5			
	Z to Y	I+ to I-	cu to cu	Red to blk	15.67	22	19	3.33	
TR3345	X to W	V+ to V-	ss to ss	Grn to wht	70.02	75	84	13.98	**GOOD**
	X to m	V+ to I+	ss to cu	Grn to red	33.61	37.5			
	X to w	V+ to I-	ss to cu	Grn to blk	41.78	45			
	W to m	V- to I+	ss to cu	Wht to red	41.93	50.5			
	W to w	V- to I-	ss to cu	Wht to blk	33.25	42			
	m to w	I+ to I-	cu to cu	Red to blk	13.71	24.5	25	11.29	
TR3360	v to u	V+ to V-	ss to ss	Grn to wht	125.83	130	136	10.17	**GOOD**
	v to t	V+ to I+	ss to cu	Grn to red	63.68	80			
	v to s	V+ to I-	ss to cu	Grn to blk	72.97	77			
	u to t	V- to I+	ss to cu	Wht to red	70.07	75			
	u to s	V- to I-	ss to cu	Wht to blk	65.5	68			
	t to s	I+ to I-	cu to cu	Red to blk	17.93	23.5	28	10.07	
TR3370	r to q	V+ to V-	ss to ss	Grn to wht	123.79	147.5	131	7.21	**GOOD**
	r to p	V+ to I+	ss to cu	Grn to red	62.68	66			
	r to n	V+ to I-	ss to cu	Grn to blk	70.13	74			
	q to p	V- to I+	ss to cu	Wht to red	69.83	76			
	q to n	V- to I-	ss to cu	Wht to blk	62.64	70			
	p to n	I+ to I-	cu to cu	Red to blk	16.17	21.5	22	5.83	
Unused	x to aa	V+ to V-	ss to ss	Grn to wht	n/c				**Not Used**
	x to z	V+ to I+	ss to cu	Grn to red	n/c				
	x to y	V+ to I-	ss to cu	Grn to blk	n/c				
	aa to z	V- to I+	ss to cu	Wht to red	n/c				
	aa to y	V- to I-	ss to cu	Wht to blk	n/c				
	z to y	I+ to I-	cu to cu	Red to blk	n/c				

C. Connector #3

Solenoid N. End Feedthrough
Connector #3

Tag	Burndy 48 Pin	Function	Wire Type	Wire Color	Resistance ? Value	? with Cables	Toshiba 5/28/97	DW	Status
TP3301	A to U	V+ to V-	ss to ss	Grn to wht	250.9	255.5	271	20.1	**GOOD**
	A to T	V+ to I+	ss to cu	Grn to red	75.82	77			
	A to S	V+ to I-	ss to cu	Grn to blk	184.4	189.5			
	U to T	V- to I+	ss to cu	Wht to red	181.54	186			
	U to S	V- to I-	ss to cu	Wht to blk	72.94	79.5			
	T to S	I+ to I-	cu to cu	Red to blk	114.7	119.5	123	8.3	
TP3302	R to P	V+ to V-	ss to ss	Grn to wht	273.8	278.5	289	15.2	**GOOD**
	R to N	V+ to I+	ss to cu	Grn to red	86.25	90			
	R to M	V+ to I-	ss to cu	Grn to blk	194.71	199			
	P to N	V- to I+	ss to cu	Wht to red	194.98	199			
	P to M	V- to I-	ss to cu	Wht to blk	86.42	90			
	N to M	I+ to I-	cu to cu	Red to blk	115.71	120	129	13.29	
TP3303	L to K	V+ to V-	ss to ss	Grn to wht	226.2	130	236	9.8	**GOOD**
	L to J	V+ to I+	ss to cu	Grn to red	61.5	66			
	L to H	V+ to I-	ss to cu	Grn to blk	169.94	175			
	K to J	V- to I+	ss to cu	Wht to red	170.08	175.5			
	K to H	V- to I-	ss to cu	Wht to blk	61.62	66			
	J to H	I+ to I-	cu to cu	Red to blk	113.65	119	124	10.35	
TP3304	G to F	V+ to V-	ss to ss	Grn to wht	166.41	171	180	13.59	**GOOD**
	G to E	V+ to I+	ss to cu	Grn to red	30.25	35			
	G to D	V+ to I-	ss to cu	Grn to blk	138.58	144			
	F to E	V- to I+	ss to cu	Wht to red	138.91	144			
	F to D	V- to I-	ss to cu	Wht to blk	30.32	35			
	E to D	I+ to I-	cu to cu	Red to blk	111.26	117	124	12.74	
TP3305	C to B	V+ to V-	ss to ss	Grn to wht	212.7	217	226	13.3	**GOOD**
	C to V	V+ to I+	ss to cu	Grn to red	54.46	58			
	C to k	V+ to I-	ss to cu	Grn to blk	162.6	167			
	B to V	V- to I+	ss to cu	Wht to red	162.7	167			
	B to k	V- to I-	ss to cu	Wht to blk	54.51	58			
	V to k	I+ to I-	cu to cu	Red to blk	113.3	118	124	10.7	
TP3306	j to i	V+ to V-	ss to ss	Grn to wht	169.45	175	191	21.55	**GOOD**
	j to h	V+ to I+	ss to cu	Grn to red	31.86	36			
	j to g	V+ to I-	ss to cu	Grn to blk	140.38	145			
	i to h	V- to I+	ss to cu	Wht to red	140.47	145			
	i to g	V- to I-	ss to cu	Wht to blk	31.89	36			
	h to g	I+ to I-	cu to cu	Red to blk	111.35	116	121	9.65	

TP3311	f to e	V+ to V-	ss to ss	Grn to wht	163.61	169	175	11.39	**GOOD**
	f to d	V+ to I+	ss to cu	Grn to red	28.78	32			
	f to c	V+ to I-	ss to cu	Grn to blk	137.43	142			
	e to d	V- to I+	ss to cu	Wht to red	137.43	142.5			
	e to c	V- to I-	ss to cu	Wht to blk	28.8	32.5			
	d to c	I+ to I-	cu to cu	Red to blk	111	116.5	124	13	
TP3312	b to a	V+ to V-	ss to ss	Grn to wht	207.3	212	219	11.7	**GOOD**
	b to Z	V+ to I+	ss to cu	Grn to red	51.6	56			
	b to Y	V+ to I-	ss to cu	Grn to blk	160.27	165			
	a to Z	V- to I+	ss to cu	Wht to red	160.49	165.5			
	a to Y	V- to I-	ss to cu	Wht to blk	51.79	56			
	Z to Y	I+ to I-	cu to cu	Red to blk	113.12	118	130	16.88	
TP3313	X to W	V+ to V-	ss to ss	Grn to wht	171.65	175.5	186	14.35	**GOOD**
	X to m	V+ to I+	ss to cu	Grn to red	32.98	36.5			
	X to w	V+ to I-	ss to cu	Grn to blk	141.58	145.5			
	W to m	V- to I+	ss to cu	Wht to red	141.63	146			
	W to w	V- to I-	ss to cu	Wht to blk	33	37			
	m to w	I+ to I-	cu to cu	Red to blk	111.56	116	121	9.44	
TP3314	v to u	V+ to V-	ss to ss	Grn to wht	228	233	240	12	**GOOD**
	v to t	V+ to I+	ss to cu	Grn to red	62.38	68			
	v to s	V+ to I-	ss to cu	Grn to blk	171.04	177			
	u to t	V- to I+	ss to cu	Wht to red	171.26	175			
	u to s	V- to I-	ss to cu	Wht to blk	62.58	66			
	t to s	I+ to I-	cu to cu	Red to blk	113.65	118	129	15.35	
TP3315	r to q	V+ to V-	ss to ss	Grn to wht	268.3	273	302	33.7	**GOOD**
	r to p	V+ to I+	ss to cu	Grn to red	83.3	87			
	r to n	V+ to I-	ss to cu	Grn to blk	191.98	196			
	q to p	V- to I+	ss to cu	Wht to red	192.29	197			
	q to n	V- to I-	ss to cu	Wht to blk	83.57	87			
	p to n	I+ to I-	cu to cu	Red to blk	115.65	120	135	19.35	
TP3316	x to aa	V+ to V-	ss to ss	Grn to wht	252.8	257	267	14.2	**GOOD**
	x to z	V+ to I+	ss to cu	Grn to red	75.28	79			
	x to y	V+ to I-	ss to cu	Grn to blk	183.92	188			
	aa to z	V- to I+	ss to cu	Wht to red	183.92	188.5			
	aa to y	V- to I-	ss to cu	Wht to blk	75.41	81			
	z to y	I+ to I-	cu to cu	Red to blk	114.95	119	134	19.05	

D. Connector #4

Solenoid N. End Feedthrough
Connector #4

Tag	Burndy 48 Pin	Function	Wire Type	Wire Color	Resistance ? Value	? with Cables	Toshiba 5/28/97	DW	Status
TP3317	A to U	V+ to V-	ss to ss	Grn to wht	168.27	173	173	4.73	**GOOD**
	A to T	V+ to I+	ss to cu	Grn to red	31.26	35			
	A to S	V+ to I-	ss to cu	Grn to blk	139.82	144			
	U to T	V- to I+	ss to cu	Wht to red	139.85	145			
	U to S	V- to I-	ss to cu	Wht to blk	31.27	36			
	T to S	I+ to I-	cu to cu	Red to blk	111.4	117	118	6.6	
TP3318	R to P	V+ to V-	ss to ss	Grn to wht	191.98	199	192	0.02	**GOOD**
	R to N	V+ to I+	ss to cu	Grn to red	43.57	50.5			
	R to M	V+ to I-	ss to cu	Grn to blk	152.15	159.5			
	P to N	V- to I+	ss to cu	Wht to red	152.22	157			
	P to M	V- to I-	ss to cu	Wht to blk	43.61	48			
	N to M	I+ to I-	cu to cu	Red to blk	112.39	117	114	1.61	
TP3319	L to K	V+ to V-	ss to ss	Grn to wht	196.11	200.5	197	0.89	**GOOD**
	L to J	V+ to I+	ss to cu	Grn to red	45.7	49.5			
	L to H	V+ to I-	ss to cu	Grn to blk	154.25	158.5			
	K to J	V- to I+	ss to cu	Wht to red	154.36	160			
	K to H	V- to I-	ss to cu	Wht to blk	45.79	50.5			
	J to H	I+ to I-	cu to cu	Red to blk	112.51	118	114	1.49	
TP3320	G to F	V+ to V-	ss to ss	Grn to wht	176.94	181	178	1.06	**GOOD**
	G to E	V+ to I+	ss to cu	Grn to red	35.84	39.5			
	G to D	V+ to I-	ss to cu	Grn to blk	144.36	148.5			
	F to E	V- to I+	ss to cu	Wht to red	144.37	149.5			
	F to D	V- to I-	ss to cu	Wht to blk	35.83	40.5			
	E to D	I+ to I-	cu to cu	Red to blk	111.78	117	113	1.22	
TP3321	C to B	V+ to V-	ss to ss	Grn to wht	153	158	154	1	**GOOD**
	C to V	V+ to I+	ss to cu	Grn to red	23.38	27			
	C to k	V+ to I-	ss to cu	Grn to blk	131.88	136			
	B to V	V- to I+	ss to cu	Wht to red	131.86	136			
	B to k	V- to I-	ss to cu	Wht to blk	23.34	27			
	V to k	I+ to I-	cu to cu	Red to blk	110.58	115	112	1.42	
TP3322	j to i	V+ to V-	ss to ss	Grn to wht	150.81	155	152	1.19	**GOOD**
	j to h	V+ to I+	ss to cu	Grn to red	22.38	26			
	j to g	V+ to I-	ss to cu	Grn to blk	130.71	135			
	i to h	V- to I+	ss to cu	Wht to red	130.67	136.5			
	i to g	V- to I-	ss to cu	Wht to blk	22.18	28			
	h to g	I+ to I-	cu to cu	Red to blk	110.58	117	113	2.42	

TP3346	f to e	V+ to V-	ss to ss	Grn to wht	196.14	201	198	1.86	**USEABLE**
Outer	f to d	V+ to I+	ss to cu	Grn to red	45.83	6			
Vacuum	f to c	V+ to I-	ss to cu	Grn to blk	196.16	203			
Vessel	e to d	V- to I+	ss to cu	Wht to red	154.33	60			
(90 Deg)	e to c	V- to I-	ss to cu	Wht to blk	0.4	50.5	(V-,I-) Shorted		
	d to c	I+ to I-	cu to cu	Red to blk	154.37	159.5	156	1.63	
TP3347	b to a	V+ to V-	ss to ss	Grn to wht	191.9	197	192	0.1	**GOOD**
	b to Z	V+ to I+	ss to cu	Grn to red	43.57	47			
	b to Y	V+ to I-	ss to cu	Grn to blk	151.7	156			
	a to Z	V- to I+	ss to cu	Wht to red	151.8	156			
	a to Y	V- to I-	ss to cu	Wht to blk	43.65	47			
	Z to Y	I+ to I-	cu to cu	Red to blk	112.25	116	116	3.75	
TP3348	X to W	V+ to V-	ss to ss	Grn to wht	142.45	147	146	3.55	**GOOD**
	X to m	V+ to I+	ss to cu	Grn to red	17.93	21.5			
	X to w	V+ to I-	ss to cu	Grn to blk	126.23	130.5			
	W to m	V- to I+	ss to cu	Wht to red	126.28	130.5			
	W to w	V- to I-	ss to cu	Wht to blk	17.97	21.5			
	m to w	I+ to I-	cu to cu	Red to blk	110.07	114.5	113	2.93	
TP3350	v to u	V+ to V-	ss to ss	Grn to wht	219.2	225.5	223	3.8	**GOOD**
	v to t	V+ to I+	ss to cu	Grn to red	57.86	62			
	v to s	V+ to I-	ss to cu	Grn to blk	166.4	171.5			
	u to t	V- to I+	ss to cu	Wht to red	166.51	171			
	u to s	V- to I-	ss to cu	Wht to blk	57.96	62			
	t to s	I+ to I-	cu to cu	Red to blk	113.49	118	116	2.51	
TP3351	r to q	V+ to V-	ss to ss	Grn to wht	196.95	201.5	205	8.05	**GOOD**
	r to p	V+ to I+	ss to cu	Grn to red	46.15	20			
	r to n	V+ to I-	ss to cu	Grn to blk	154.58	159			
	q to p	V- to I+	ss to cu	Wht to red	154.76	159			
	q to n	V- to I-	ss to cu	Wht to blk	46.35	20			
	p to n	I+ to I-	cu to cu	Red to blk	112.42	117	115	2.58	
TP3352	x to aa	V+ to V-	ss to ss	Grn to wht	206.8	211	209	2.2	**GOOD**
	x to z	V+ to I+	ss to cu	Grn to red	51.4	55			
	x to y	V+ to I-	ss to cu	Grn to blk	159.94	164			
	aa to z	V- to I+	ss to cu	Wht to red	159.89	164			
	aa to y	V- to I-	ss to cu	Wht to blk	51.44	55			
	z to y	I+ to I-	cu to cu	Red to blk	112.95	117	115	2.05	

F. Connector #5

Solenoid N. End Feedthrough
Connector #5

Tag	Burndy 48 Pin	Function	Wire Type	Wire Color	Resistance ? Value	? with Cables	Toshiba 5/28/97	DW	Status
TP3353	A to U	V+ to V-	ss to ss	Grn to wht	196.06	202	198	1.94	**GOOD**
	A to T	V+ to I+	ss to cu	Grn to red	45.68	49.5			
	A to S	V+ to I-	ss to cu	Grn to blk	154.22	158.5			
	U to T	V- to I+	ss to cu	Wht to red	154.33	161			
	U to S	V- to I-	ss to cu	Wht to blk	45.8	51.5			
	T to S	I+ to I-	cu to cu	Red to blk	112.52	119	115	2.48	
TP3354	R to P	V+ to V-	ss to ss	Grn to wht	241.8	246.5	245	3.2	**GOOD**
	R to N	V+ to I+	ss to cu	Grn to red	69.71	85			
	R to M	V+ to I-	ss to cu	Grn to blk	178.27	191			
	P to N	V- to I+	ss to cu	Wht to red	178.31	183.5			
	P to M	V- to I-	ss to cu	Wht to blk	69.72	74			
	N to M	I+ to I-	cu to cu	Red to blk	114.58	120	118	3.42	
TP3355	L to K	V+ to V-	ss to ss	Grn to wht	188.77	194	193	4.23	**GOOD**
	L to J	V+ to I+	ss to cu	Grn to red	41.88	49			
	L to H	V+ to I-	ss to cu	Grn to blk	150.47	158			
	K to J	V- to I+	ss to cu	Wht to red	150.55	155.5			
	K to H	V- to I-	ss to cu	Wht to blk	41.94	46			
	J to H	I+ to I-	cu to cu	Red to blk	112.25	116	116	3.75	
Strain	G to F	V+ to V-	ss to ss	Grn to wht	n/c				**Not Used**
	G to E	V+ to I+	ss to cu	Grn to red	n/c				
	G to D	V+ to I-	ss to cu	Grn to blk	n/c				
	F to E	V- to I+	ss to cu	Wht to red	n/c				
	F to D	V- to I-	ss to cu	Wht to blk	n/c				
	E to D	I+ to I-	cu to cu	Red to blk	n/c				
Strain	C to B	V+ to V-	ss to ss	Grn to wht	n/c				**Not Used**
	C to V	V+ to I+	ss to cu	Grn to red	n/c				
	C to k	V+ to I-	ss to cu	Grn to blk	n/c				
	B to V	V- to I+	ss to cu	Wht to red	n/c				
	B to k	V- to I-	ss to cu	Wht to blk	n/c				
	V to k	I+ to I-	cu to cu	Red to blk	n/c				
Strain	j to i	V+ to V-	ss to ss	Grn to wht	n/c				**Not Used**
	j to h	V+ to I+	ss to cu	Grn to red	n/c				
	j to g	V+ to I-	ss to cu	Grn to blk	n/c				
	i to h	V- to I+	ss to cu	Wht to red	n/c				
	i to g	V- to I-	ss to cu	Wht to blk	n/c				
	h to g	I+ to I-	cu to cu	Red to blk	n/c				

Strain	f to e	V+ to V-	ss to ss	Grn to wht	2.91	**Not Used**
	f to d	V+ to I+	ss to cu	Grn to red	n/c	
	f to c	V+ to I-	ss to cu	Grn to blk	n/c	
	e to d	V- to I+	ss to cu	Wht to red	n/c	
	e to c	V- to I-	ss to cu	Wht to blk	n/c	
	d to c	I+ to I-	cu to cu	Red to blk	122.86	
Strain	b to a	V+ to V-	ss to ss	Grn to wht	n/c	**Not Used**
	b to Z	V+ to I+	ss to cu	Grn to red	n/c	
	b to Y	V+ to I-	ss to cu	Grn to blk	n/c	
	a to Z	V- to I+	ss to cu	Wht to red	124.7	
	a to Y	V- to I-	ss to cu	Wht to blk	124.68	
	Z to Y	I+ to I-	cu to cu	Red to blk	4.82	
Strain	X to W	V+ to V-	ss to ss	Grn to wht	124.72	**Not Used**
	X to m	V+ to I+	ss to cu	Grn to red	124.69	
	X to w	V+ to I-	ss to cu	Grn to blk	n/c	
	W to m	V- to I+	ss to cu	Wht to red	4.79	
	W to w	V- to I-	ss to cu	Wht to blk	n/c	
	m to w	I+ to I-	cu to cu	Red to blk	n/c	
Strain	v to u	V+ to V-	ss to ss	Grn to wht	2.97	**Not Used**
	v to t	V+ to I+	ss to cu	Grn to red	n/c	
	v to s	V+ to I-	ss to cu	Grn to blk	n/c	
	u to t	V- to I+	ss to cu	Wht to red	n/c	
	u to s	V- to I-	ss to cu	Wht to blk	n/c	
	t to s	I+ to I-	cu to cu	Red to blk	n/c	
Strain	r to q	V+ to V-	ss to ss	Grn to wht	n/c	**Not Used**
	r to p	V+ to I+	ss to cu	Grn to red	n/c	
	r to n	V+ to I-	ss to cu	Grn to blk	n/c	
	q to p	V- to I+	ss to cu	Wht to red	n/c	
	q to n	V- to I-	ss to cu	Wht to blk	n/c	
	p to n	I+ to I-	cu to cu	Red to blk	n/c	
Strain	x to aa	V+ to V-	ss to ss	Grn to wht	n/c	**Not Used**
	x to z	V+ to I+	ss to cu	Grn to red	n/c	
	x to y	V+ to I-	ss to cu	Grn to blk	n/c	
	aa to z	V- to I+	ss to cu	Wht to red	n/c	
	aa to y	V- to I-	ss to cu	Wht to blk	n/c	
	z to y	I+ to I-	cu to cu	Red to blk	n/c	

III. Control Dewar

Connector #1

Tag	Burndy 48 Pin	Function	Wire Type	Wire Color	Resistance ? Value	Status
TRSCOUT	A to U	V+ to V-	ss to ss	Grn to wht	135.9	**GOOD**
	A to T	V+ to I+	ss to cu	Grn to red	67.3	
	A to S	V+ to I-	ss to cu	Grn to blk	75.7	
	U to T	V- to I+	ss to cu	Wht to red	76	
	U to S	V- to I-	ss to cu	Wht to blk	67.3	
	T to S	I+ to I-	cu to cu	Red to blk	15.8	
TR3212	R to P	V+ to V-	ss to ss	Grn to wht	136.3	**GOOD**
	R to N	V+ to I+	ss to cu	Grn to red	69.5	
	R to M	V+ to I-	ss to cu	Grn to blk	75.4	
	P to N	V- to I+	ss to cu	Wht to red	75.5	
	P to M	V- to I-	ss to cu	Wht to blk	69.1	
	N to M	I+ to I-	cu to cu	Red to blk	14.60	
TP3208	L to K	V+ to V-	ss to ss	Grn to wht	236.3	**GOOD**
	L to J	V+ to I+	ss to cu	Grn to red	66.8	
	L to H	V+ to I-	ss to cu	Grn to blk	175	
	K to J	V- to I+	ss to cu	Wht to red	175.00	
	K to H	V- to I-	ss to cu	Wht to blk	66.8	
	J to H	I+ to I-	cu to cu	Red to blk	113.8	
TP3207	G to F	V+ to V-	ss to ss	Grn to wht	235.9	**GOOD**
	G to E	V+ to I+	ss to cu	Grn to red	66.5	
	G to D	V+ to I-	ss to cu	Grn to blk	174.7	
	F to E	V- to I+	ss to cu	Wht to red	175	
	F to D	V- to I-	ss to cu	Wht to blk	66.7	
	E to D	I+ to I-	cu to cu	Red to blk	113.7	
TP3206	C to B	V+ to V-	ss to ss	Grn to wht	242.7	**GOOD**
	C to V	V+ to I+	ss to cu	Grn to red	69.5	
	C to k	V+ to I-	ss to cu	Grn to blk	177.6	
	B to V	V- to I+	ss to cu	Wht to red	177.8	
	B to k	V- to I-	ss to cu	Wht to blk	69.6	
	V to k	I+ to I-	cu to cu	Red to blk	114.3	
TP3225	j to i	V+ to V-	ss to ss	Grn to wht	239.2	**GOOD**
	j to h	V+ to I+	ss to cu	Grn to red	68.2	
	j to g	V+ to I-	ss to cu	Grn to blk	176.4	
	i to h	V- to I+	ss to cu	Wht to red	176.6	
	i to g	V- to I-	ss to cu	Wht to blk	68.4	
	h to g	I+ to I-	cu to cu	Red to blk	113.9	

Connector #2

Tag	Burndy 48 Pin	Function	Wire Type	Wire Color	Resistance ? Value	Status
TR3268	G to F	V+ to V-	ss to ss	Grn to wht	56.7	**GOOD**
	G to E	V+ to I+	ss to cu	Grn to red	35.2	
	G to D	V+ to I-	ss to cu	Grn to blk	28.8	
	F to E	V- to I+	ss to cu	Wht to red	29.2	
	F to D	V- to I-	ss to cu	Wht to blk	2835.1	
	E to D	I+ to I-	cu to cu	Red to blk	1214.1	

Connector #3

TR3278	B to A	V+ to V-	ss to ss	Grn to wht	0	**Broken Wires during Shipping Toshiba to Repair**
	B to G	V+ to I+	ss to cu	Grn to red	0	
	B to F	V+ to I-	ss to cu	Grn to blk	0	
	A to G	V- to I+	ss to cu	Wht to red	0	
	A to F	V- to I-	ss to cu	Wht to blk	0	
	G to F	I+ to I-	cu to cu	Red to blk	0	

Connector #4

LL3250A	G to F	V+ to V-	ss to ss	red to blk	285	**GOOD**
	G to E	V+ to I+	ss to cu	red to grn	20	
	F to D	V- to I-	ss to cu	blk to wht	17	
	E to D	I+ to I-	cu to cu	grn to wht	270	
LL3250B	C to B	V+ to V-	ss to ss	red to blk	286	**GOOD**
	C to A	V+ to I+	ss to cu	red to grn	20	
	B to H	V- to I-	ss to cu	blk to wht	20	
	A to H	I+ to I-	cu to cu	grn to wht	270	

Connector #5

TP3269	B to A	V+ to V-	ss to ss	Grn to wht	16.9	**GOOD**
	B to G	V+ to I+	ss to cu	Grn to red	8.5	
	B to F	V+ to I-	ss to cu	Grn to blk	116.9	
	A to G	V- to I+	ss to cu	Wht to red	116.9	
	A to F	V- to I-	ss to cu	Wht to blk	8.6	
	G to F	I+ to I-	cu to cu	Red to blk	109.1	

Connector #6

TP3279	B to A	V+ to V-	ss to ss	Grn to wht	124.8	**GOOD**
	B to G	V+ to I+	ss to cu	Grn to red	8.6	
	B to F	V+ to I-	ss to cu	Grn to blk	117	
	A to G	V- to I+	ss to cu	Wht to red	117	
	A to F	V- to I-	ss to cu	Wht to blk	8.7	
	G to F	I+ to I-	cu to cu	Red to blk	109.2	